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INTERNATIONAL BUSINESS MACHINES CORPORATION
DEPT. 18G
BLDG. 321-482
2070 ROUTE 52
HOPEWELL JUNCTION, NY 12533

EXAMINER	
HARM, NICKOLAS R	

ART UNIT	PAPER NUMBER
1791	

NOTIFICATION DATE	DELIVERY MODE
06/17/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

EFIPLAW@US.IBM.COM

Office Action Summary	Application No.	Applicant(s)	
	10/595,550	NATARAJAN ET AL.	
	Examiner	Art Unit	
	NICKOLAS HARM	4191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *3/4/2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/27/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Summary

1. Claims 1-25 are present and have been fully considered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-4, 7-11, 14-17, 19-23, and 25 have been considered but are moot in view of the new ground(s) of rejection.

Terminal Disclaimer

3. The terminal disclaimer filed on March 4, 2009 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US 6,627,020 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 25 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear as to how the multilayer ceramic laminate of claim 14 further comprises discrete tailored shapes, or how a ceramic structure comprising

tailored shapes can control distortion within the laminate. For the purposes of this rejection, examiner will read this claim as "The multilayer ceramic laminate structure of claim 14, where said at least one first continuous non-densifying structure further comprises tailored shapes to control local distortion within the multilayer ceramic laminate."

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.,* 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1-2 and 7 rejected under 35 U.S.C. 103(a) as being unpatentable over LEE et al. (US 2003/0168150 A1) in view of CASSIDY et al. (US 6,221,193).

a. Claim 1 requires a method to control post sinter dimension of a multilayer ceramic substrate sintered under load, comprising the steps of providing at least one first continuous non-densifying structure, providing at least one personalized

ceramic greensheet having a local peripheral kerf area and an external peripheral kerf area, and placing at least one first continuous non-densifying structure on the local peripheral kerf area of at least one personalized ceramic greensheet. LEE teaches piling a constrain layer on a dielectric layer printed with heterogeneous materials to reduce shrinkage, leaving windows in the constrain layer in positions complying with the personalized areas (para. 0020). One of ordinary skill in the art would understand LEE's constrain layer to be equivalent to the claimed non-densifying structure and LEE's printed dielectric layer to be equivalent to the claimed personalized ceramic greensheet. Further, one of ordinary skill in the art would understand the constrain layer to be placed on the kerf area of the greensheet, both local and external to the personalized areas. Claim 1 requires the step of green-sizing away the external peripheral kerf area from the multilayer ceramic substrate before sintering, and the step of separating the local peripheral kerf area from the multilayer ceramic substrate after sintering the multilayer ceramic substrate. CASSIDY teaches the step of sizing the greensheet laminate to remove the kerf from the active areas of the multilayer ceramic substrate (col. 5, lines 36-40). This is equivalent to the step of removing the external kerf area prior to sintering. One of ordinary skill in the art would combine the teaching of CASSIDY with the teaching of LEE because both are concerned with methods of reducing defects in the production of multilayer semiconductor devices, and CASSIDY provides a method of removing excess material from the product at a stage in the process where said material can be

easily removed as a green ceramic, instead of as a sintered integral body. LEE teaches that the multilayer structure may be cut according to the circuit printed (para. 0048), which is equivalent to the claimed step of post-sinter separation of the local peripheral kerf area. It would be obvious to one of ordinary skill in the art at the time of the invention to perform the pre-sinter sizing step of CASSIDY, in addition to the post-sinter sizing step of LEE, because one of ordinary skill in the art would want to adjust the shape of the personalized greensheet before sintering in order to fit the greensheet in a press, and some kerf area must remain until after sintering in order to hold the non-densifying structures during sintering. Claim 1 requires the steps of placing at least one personalized ceramic greensheet having at least one first continuous non-densifying structure in a stack of personalized greensheets, laminating the stack of personalized ceramic greensheets to form a green ceramic laminate where at least one first continuous non-densifying structure will at least partially control the dimensions of the green ceramic laminate during lamination, and sintering the green ceramic laminate under load to form a multilayer ceramic substrate where at least one first continuous non-densifying structure will at least partially control the dimensions of said multilayer ceramic substrate during sintering. LEE teaches that more than one dielectric layer can be stacked (para. 0021), that once stacked the structure can be laminated (para. 0021), that the stack is subjected to a heating step (para. 0022), that pressure may be applied during the firing (para. 0022), and the ceramic will sinter during heating (para. 0035).

b. Claim 7 requires the method of claim 1, where each personalized ceramic greensheet has a plurality of personalized regions, so that the sintered, stacked, multilayer ceramic laminate is a multi-up multilayer ceramic substrate. Figure 1 of LEE shows an embodiment of the LEE invention, either greensheet, laminate, or sintered substrate, that comprises at least 9 separate personalized regions. Therefore, it would be obvious to practice the method of claim 1, where each personalized ceramic greensheet has a plurality of personalized regions.

9. Claims 3, 4-6, 8-25 rejected under 35 U.S.C. 103(a) as being unpatentable over LEE and CASSIDY as applied to claims 1, 4, and 7 above, and further in view of NATARAJAN et al. (US 6,627,020).

c. Claim 2 requires the method of claim 1, with the additional step of post-sinter sizing the multilayer ceramic substrate to separate at least one continuous non-densifying structure from the multilayer substrate. NATARAJAN teaches the step of sizing the multilayer ceramic substrate, post-sintering, thereby separating the at least one discrete non-densifying structure from the multilayer substrates (col. 10, lines 39-43). One of ordinary skill in the art would combine the teaching of NATARAJAN with the references as combined, because one of ordinary skill would want to release the multilayer ceramic product from the non-densifying structure, allowing for use of the ceramic product and possible reuse of the non-densifying structure. Therefore, it would be obvious to one of ordinary skill in the art to practice the method of claim 1, with the additional step of post-sinter sizing

the multilayer ceramic substrate to separate at least one continuous non-densifying structure from the multilayer substrate.

d. Claim 3 requires the method of claim 1 with the additional step of providing at least one second continuous non-densifying structure. LEE teaches placing a constrain layer on the bottom of the ceramic body (para. 0020), which is equivalent to the claimed second non-densifying structure. Claim 3 requires the step of placing at least one second continuous non-densifying structure on the external peripheral kerf area of at least one personalized ceramic greensheet prior to lamination where at least one second continuous non-densifying structure will at least partially control the dimensions of the green ceramic laminate during lamination. LEE teaches that the printed portion of the ceramic sheet should not be covered by the constrain layer (para. 0021), which one of ordinary skill in the art would understand to mean that the constrain layer should be placed on the kerf area of the structure. Finally, claim 3 requires the step of pre-sinter sizing the green ceramic laminate to separate at least one second continuous non-densifying structure from the green ceramic laminate prior to sintering. CASSIDY teaches the step of sizing the greensheet laminate to separate the active areas from the kerf. NATARAJAN teaches the step of separating the second at least one non-densifying structure from the multi-up green ceramic laminate prior to sintering (col. 12, lines 3-5). LEE, CASSIDY, and NATARAJAN are analogous arts, and it would be obvious to one of ordinary skill in the art to remove the at least one second continuous non-densifying structure from the green ceramic

laminate along with the laminate that is sized away in order to reduce the process time and expense associated with removing the structure after sintering.

e. Claim 4 requires the method of claim 3 where the first and second continuous non-densifying structure is metal, ceramic, polymer, or a combination thereof. LEE teaches that the constrain layer can be alumina, glass, or glass/ceramic (para. 0033).

f. Claim 5 requires the method of claim 3 where the first and second non-densifying structure is a metal selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia. NATARAJAN teaches a plurality of non-densifying structures selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia (col. 9, lines 46-49). One of ordinary skill in the art would use the materials taught by NATARAJAN in place of those in the references above as combined because all are analogous arts, and the materials of NATARAJAN are functional equivalent alternate expedients of those used in the references as combined.

g. Claim 6 requires the method of claim 3 where the first and second non-densifying structure as a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm (0.02 inch). NATARAJAN teaches non-densifying structures with a thickness of 0.0003 inch to 0.001 inch and width of 0.002 inch to 0.008 inch, as well as the fact that it would be obvious to one of ordinary skill in the art to vary the width and thickness of these structures (col. 6,

lines 50-57). Therefore, it would be obvious to one of ordinary skill in the art to practice the method of claim 3 where the first and second non-densifying structure has a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm.

h. Claim 8 requires the method of claim 7, with the additional step of post-sinter sizing the multi-up multilayer ceramic substrate to form individual multilayer ceramic substrates, thereby separating at least one first continuous non-densifying structure from the individual multilayer ceramic substrates. NATARAJAN teaches the step of sizing the multi-up multilayer ceramic substrate (post-sintering) to form individual multilayer ceramic substrates and thereby separating the at least one discrete non-densifying structure from the individual multilayer ceramic substrates (col. 10, lines 39-43).

i. Claim 9 requires the method of claim 7 with the additional step of providing at least one second continuous non-densifying structure. LEE teaches placing a constrain layer on the bottom of the ceramic body (para. 0020), which is equivalent to the claimed second non-densifying structure. Claim 9 requires the step of placing at least one second continuous non-densifying structure on the external peripheral kerf area of at least one personalized ceramic greensheet prior to lamination where at least one second continuous non-densifying structure will at least partially control the dimensions of the green ceramic laminate during lamination. LEE teaches that the printed portion of the ceramic sheet should not be covered by the constrain layer (para. 0021), which one of ordinary skill in the

art would understand to mean that the constrain layer should be placed on the kerf area of the structure, between the product samples and/or surrounding them. Finally, claim 9 requires the step of pre-sinter sizing the green ceramic laminate to separate at least one second continuous non-densifying structure from the green ceramic laminate prior to sintering. CASSIDY teaches the step of sizing the greensheet laminate to separate the active areas from the kerf. NATARAJAN teaches the step of separating the second at least one non-densifying structure from the multi-up green ceramic laminate prior to sintering (col. 12, lines 3-5). LEE, CASSIDY, and NATARAJAN are analogous arts, and it would be obvious to one of ordinary skill in the art to remove the at least one second continuous non-densifying structure from the green ceramic laminate along with the laminate that is sized away in order to reduce the process time and expense associated with removing the structure after sintering.

j. Claim 10 requires the method of claim 7, where the at least one first continuous non-densifying structure further comprises tailored shapes to control local distortion within the product samples. LEE teaches windows in the constrain layer that are in positions complying with the materials printed on the ceramic body (para. 0020). One of ordinary skill in the art would understand this constrain layer, therefore, to be a shape that is tailored to the printing on the ceramic body.

k. Claim 11 requires the method of claim 9, where the first and second continuous non-densifying structure is metal, ceramic, polymer, or a combination

thereof. LEE teaches that the constrain layer can be alumina, glass, or glass/ceramic (para. 0033).

l. Claim 12 requires the method of claim 9, where the non-densifying structures are a metal selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia. NATARAJAN teaches a plurality of non-densifying structures selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia (col. 9, lines 46-49). One of ordinary skill in the art would use the materials taught by NATARAJAN in place of those in the references above as combined because all are analogous arts, and the materials of NATARAJAN are functional equivalent alternate expedients of those used in the references as combined.

m. Claim 13 requires the method of claim 9, where the first and second non-densifying structure as a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm (0.02 inch). NATARAJAN teaches non-densifying structures with a thickness of 0.0003 inch to 0.001 inch and width of 0.002 inch to 0.008 inch, as well as the fact that it would be obvious to one of ordinary skill in the art to vary the width and thickness of these structures (col. 6, lines 50-57). Therefore, it would be obvious to one of ordinary skill in the art to practice the method of claim 9, where the first and second non-densifying structure has a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm.

n. Claim 14 requires a multilayer ceramic laminate comprising a plurality of ceramic greensheets, at least one personalized ceramic greensheet having a peripheral kerf area, and at least one non-densifying structure placed on the local peripheral kerf are of the at least one personalized ceramic greensheet. While applicant amended claim 14 to add language describing what will happen to said multilayer ceramic laminate, this is merely intended use. NATARAJAN teaches a method comprising the steps of providing at least one non-densifying structure, placing at least one non-densifying structure on the kerf area of at least one personalized ceramic greensheet, placing the at least one personalized ceramic greensheet in a stack of personalized ceramic greensheets, and laminating the stack to form a multilayer ceramic laminate (col. 10, lines 18-39). Because the multilayer ceramic laminate claimed is necessarily an intermediate product of the method taught by NATARAHAN, the multilayer ceramic laminate as claimed would be obvious to one of ordinary skill in the art.

o. Claim 15 requires the multilayer ceramic laminate of claim 14, where at least one second continuous non-densifying structure is placed on the external kerf area. NATARAJAN teaches the step of placing at least one second non-densifying structure on the kerf area of the multilayer ceramic substrate (col. 10, lines 60-63). While NATARAJAN teaches only placing a second non-densifying structure on the kerf area between product samples, LEE teaches placing a constrain layer on the bottom of the ceramic body (para. 0020), which is equivalent to the claimed second non-densifying structure. LEE also teaches

that the printed portion of the ceramic sheet should not be covered by the constrain layer (para. 0021), which one of ordinary skill in the art would understand to mean that the constrain layer should be placed on the kerf area of the structure.

p. Claim 16 requires the multilayer ceramic laminate of claim 15, where the first and second continuous non-densifying structure is metal, ceramic, polymer, or a combination thereof. LEE teaches that the constrain layer can be alumina, glass, or glass/ceramic (para. 0033).

q. Claim 17 requires the multilayer ceramic laminate of claim 15, where the first and second non-densifying structure is a metal selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia. NATARAJAN teaches a plurality of non-densifying structures selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia (col. 9, lines 46-49). One of ordinary skill in the art would use the materials taught by NATARAJAN in place of those in the references above as combined because all are analogous arts, and the materials of NATARAJAN are functional equivalent alternate expedients of those used in the references as combined.

r. Claim 18 requires the multilayer ceramic laminate of claim 15, where the first and second non-densifying structure as a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm (0.02 inch). NATARAJAN teaches non-densifying structures with a thickness of 0.0003 inch to 0.001 inch

and width of 0.002 inch to 0.008 inch, as well as the fact that it would be obvious to one of ordinary skill in the art to vary the width and thickness of these structures (col. 6, lines 50-57). Therefore, it would be obvious to one of ordinary skill in the art to practice the method of claim 15, where the first and second non-densifying structure has a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm.

s. Claim 19 requires the multilayer ceramic structure of claim 14, with the additional limitation that the structure is a multi-up multilayer structure. NATARAJAN teaches that the multilayer structure can be a multi-up multilayer structure (col. 10, lines 23-26).

t. Claim 20 requires the multi-up multilayer structure of claim 19, where at least one second continuous non-densifying structure is placed on the external peripheral kerf area. NATARAJAN teaches the step of placing at least one second non-densifying structure on the kerf area of the multilayer ceramic substrate (col. 10, lines 60-63). While NATARAJAN teaches only placing a second non-densifying structure on the kerf area between product samples, LEE teaches placing a constrain layer on the bottom of the ceramic body (para. 0020), which is equivalent to the claimed second non-densifying structure. LEE also teaches that the printed portion of the ceramic sheet should not be covered by the constrain layer (para. 0021), which one of ordinary skill in the art would understand to mean that the constrain layer should be placed on the kerf area of the structure.

u. Claim 21 requires the multi-up multilayer ceramic laminate of claim 19, where at least one first continuous non-densifying structure further comprises tailored shapes to control local distortion within the product samples. LEE teaches windows in the constrain layer that are in positions complying with the materials printed on the ceramic body (para. 0020). One of ordinary skill in the art would understand this constrain layer, therefore, to be a shape that is tailored to the printing on the ceramic body.

v. Claim 22 requires the multi-up multilayer ceramic laminate of claim 20, where the first and second continuous non-densifying structure is metal, ceramic, polymer, or a combination thereof. LEE teaches that the constrain layer can be alumina, glass, or glass/ceramic (para. 0033).

w. Claim 23 requires the multi-up multilayer ceramic laminate of claim 20, where the first and second non-densifying structure is a metal selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia. NATARAJAN teaches a plurality of non-densifying structures selected from the group consisting of molybdenum, nickel, copper, tungsten, stainless-steel, and zirconia (col. 9, lines 46-49). One of ordinary skill in the art would use the materials taught by NATARAJAN in place of those in the references above as combined because all are analogous arts, and the materials of NATARAJAN are functional equivalent alternate expedients of those used in the references as combined.

x. Claim 24 requires the multi-up multilayer ceramic laminate of claim 20, where the first and second non-densifying structure as a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm (0.02 inch). NATARAJAN teaches non-densifying structures with a thickness of 0.0003 inch to 0.001 inch and width of 0.002 inch to 0.008 inch, as well as the fact that it would be obvious to one of ordinary skill in the art to vary the width and thickness of these structures (col. 6, lines 50-57). Therefore, it would be obvious to one of ordinary skill in the art to practice the method of claim 20, where the first and second non-densifying structure has a thickness of approximately 0.0003 inch to 0.001 inch and a width of greater than 0.5 mm.

y. Claim 25 requires the multilayer ceramic laminate of claim 14, further comprising discrete tailored shapes to control local distortion within the multilayer ceramic laminate. LEE teaches windows in the constrain layer that are in positions complying with the materials printed on the ceramic body (para. 0020). One of ordinary skill in the art would understand this constrain layer, therefore, to be a shape that is tailored to the printing on the ceramic body.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICKOLAS HARM whose telephone number is (571)270-7605. The examiner can normally be reached on Mon-Thurs, 7:30a-5:00p EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip Tucker can be reached on (571)272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NICKOLAS HARM/
Examiner, Art Unit 4191

/Mark A Osele/
Primary Examiner, Art Unit 1791
June 5, 2009